ABSTRACT OF THE DISCLOSURE

The method for generating a hydrogen-rich stream from hydrocarbon fuels, ultimately to produce hydrogen gas, involves the following two steps performed in a cyclic fashion: (1) pyrolysis of the hydrocarbon fuel to obtain a carbon-rich fraction and a hydrogen-rich fraction; and (2) oxidation of the carbon-rich fraction, or a portion of it, for heat generation. The method involves the following optional steps: (3) steam gasification of part of the carbon-rich fraction to produce additional amounts of hydrogen and carbon monoxide; (4) water-gas shift reaction to convert carbon monoxide to carbon dioxide with the simultaneous formation of additional amounts of hydrogen; and (5) steam reforming of light hydrocarbons that may be produced in step (1) to produce more hydrogen and carbon monoxide.

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